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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF APPEALS AND INTERFERENCES

In re application of:		:	Examining Group: 2618
	Nowlin et al.	:	Examiner: Haroon
Serial No.:	10/645,360	:	Date: May 30, 2007
Filed:	August 21, 2003	:	
For:	*Comfort Noise Generator*		

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BRIEF ON APPEAL

Hon. Commissioner for Patents
Alexandria, Virginia 22313
SIR:

Enclosed is a Brief in support of an appeal from the rejection of claims 1–10 in the final Office Action dated January 3, 2007, in the above-identified application. A check in payment of the requisite fee under 37 CFR 41.20(b)(2) is enclosed.

An oral hearing is waived.

Respectfully submitted,

Paul F. Wille

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BRIEF ON APPEAL

I. Real Party in Interest

The real party in interest is Acoustic Technologies, Inc. by assignment recorded at Reel 014423, frame 0536.

II. Related Appeals and Interferences

None.

III. Status of Claims

Claims 1–10 stand rejected.

IV. Status of Amendments

All amendments have been entered.

V. Summary of Claimed Subject Matter

The invention relates to a "comfort noise" generator. Comfort noise is added to the signal in a telephone system so a user does not think that a connection has been broken. In accordance with the invention, comfort noise is derived from a white noise signal by filtering the white noise signal in a quadrature mirror filter (QMF) bank. The signal in a channel is divided into sub-bands in a bank of filters. The magnitude of the white noise into each QMF filter is controlled in accordance with

the magnitude of the signal in a corresponding sub-band in a channel. In accordance with another aspect of the invention, the signals from higher frequency sub-bands are combined and control a single input to a QMF bank, thereby increasing the low frequency content of the comfort noise. In accordance with another aspect of the invention, the QMF banks are cascaded upwardly (the output of one bank is coupled to the low pass input of the next bank), which provides finer spectral resolution at low frequencies.

The following table relates the appealed claims to the specification. The table is not exhaustive of all possible cross-references. The table merely shows support, not breadth.

1. A method for providing a comfort noise signal in a telephone having a receive channel and a transmit channel and a plurality of sub-band filters (54) in at least one channel, said method comprising the steps of:	FIG. 5; page 5, lines 8–13
generating a white noise signal (71, 74);	FIG. 6; page 6, line 11;
applying the white noise signal to a QMF filter bank (77) to produce a comfort noise signal,	FIG. 6; page 6, line 13;
wherein the magnitude of the white noise into each QMF filter is controlled (72, 73) in accordance with the magnitude of the signal in a corresponding sub-band (75, 76) in the one channel; and	FIG. 6; page 6, lines 14–20
selectively coupling (56) the comfort noise signal (57) to at least one of the channels.	FIG. 5; page 5, lines 24–25
2. The method as set forth in claim 1 wherein said applying step includes the steps of:	

coupling white noise signal (74) through a first multiplier (73) to the low pass input of the QMF bank (77); coupling white noise signal (71) through a second multiplier (72) to the high pass input of the QMF bank (77); controlling the gain of the first multiplier in accordance with the magnitude of the signal in a first analysis sub-band (76); controlling the gain of the second multiplier in accordance with the magnitude of the signal in a second analysis sub-band (75); wherein the first sub-band (76) has a lower frequency than the second sub-band (75).	FIG. 6: page 6, lines 11–20;
3. The method as set forth in claim 2 and further including the steps of:	
combining the output signals from two or more analysis sub-band filters (91, 92) to produce a combined signal; and	FIG. 8; page 9, lines 1–3;
controlling the gain of the second multiplier (121) in accordance with the combined signal (111).	FIG. 8; page 9, lines 18–22;
4. The method as set forth in claim 3 wherein the telephone includes n analysis sub-bands and there are no more than (n–1) QMF banks and further including the step of:	page 9, lines 8–11;
upwardly cascading the QMF banks to increase the low frequency resolution of the comfort noise signal.	page 2, lines 25–28; page 8, lines 10–12
5. The method as set forth in claim 3 wherein the telephone includes n analysis sub-bands and there are no more than (n–1) QMF banks and further including the step of:	page 9, lines 8–11;
combining the outputs from higher frequency sub-band filters to increase the low frequency resolution of the comfort noise signal.	FIG. 8; page 2, lines 25–28;
6. In a cellular telephone having an antenna, an RF stage coupled to said antenna, and a signal processing circuit including an audio processor having a receive channel and a transmit channel and a plurality of analysis sub-band filters (54) in at least one of the channels, said cellular telephone characterized by a comfort noise generator comprising:	FIG. 4
a white noise generator (71, 74);	FIG. 6; page 6, line 11;

at least one QMF bank (77) producing a comfort noise signal, said QMF bank having a high pass input and a low pass input;	FIG. 6; page 6, line 13
a first multiplier (72) having a control input coupled to a first (75) of said analysis sub-band filters;	FIG. 6; page 6, lines 11–20;
a second multiplier (73) having a control input coupled to a second (76) of said analysis sub-band filters;	FIG. 6; page 6, lines 11–20;
wherein the first multiplier couples said white noise generator to said low pass input and said second multiplier couples said white noise generator to said high pass input;	FIG. 6; page 6, lines 11–20;
means (56) for selectively coupling the comfort noise signal to at least one of the channels.	FIG. 5; page 5, lines 24–25
7. The cellular telephone as set forth in claim 6 and further comprising:	
n analysis sub-band filters and no more than (n–1) QMF banks;	page 9, lines 8–11;
wherein the QMF banks are upwardly cascaded.	page 2, lines 25–28;
8. The cellular telephone as set forth in claim 6 and further including:	
at least one summation circuit for coupling the outputs of more than one analysis sub-band filter to the control input of a multiplier.	FIG. 8; page 9, lines 1–3;
9. The cellular telephone as set forth in claim 8 and further comprising:	
n analysis sub-band filters and no more than (n–1) QMF banks;	page 9, lines 8–11;
wherein the QMF banks are upwardly cascaded.	page 2, lines 25–28;
10. The cellular telephone as set forth in claim 9 wherein the number of QMF banks is ($^n/_2$ –1).	page 13, lines 12-13

VI. Grounds of Rejection for Review on Appeal

Are claims 1–10 unpatentable over Swaminathan et al. (U.S. 5,630,016) in view of Uchino et al. (2003/006362)?

VII. Argument

Claims 1–10 were rejected as unpatentable over Swaminathan et al. in view of Uchino et al. The Swaminathan et al. patent relates to comfort noise but takes a

different approach from appellants, believed called the "snippet" approach, wherein pieces of actual background noise are used for comfort noise. As such, there is the obvious question of why someone (Uchino et al.) measuring delay in a "digital line" would concern himself with a comfort noise generator.

The Swaminathan et al. patent discloses the following in the abstract.

> "The comfort noise generator includes synthesis codebook with samples scaled by actual background noise and excitation codebook with samples filtered and scaled by the background noise that are combined to produce comfort noise having attributes and loudness level of the received background noise prior to interruption of transmission."

There is no disclosure of modifying white noise in accordance with the content of a sub-band signal.

The Uchino et al. publication relates to "properly evaluating a phase noise transfer characteristic of a device under analysis in a short measuring time" (paragraph [0002]). What is the device under analysis in the Uchino et al. publication? The claimed invention relates to a telephone, which is not under test. Is the comfort noise for testing a user? It is respectfully submitted that there is no basis for the combination; *In re Rouffet*, 47 USPQ2d 1453, at 1457 (Fed. Cir. 1998).

The Examiner alleges that appellants treat the citations individually whereas the rejection is based upon a combination. One wonders how, unless two people spoke simultaneously, one could treat two citations other than individually. The criticism seems odd. Perhaps what is meant is that the combination of citations was not considered.

An argument under *In re Rouffet*, questioning the combination, was presented more than once during prosecution before the Examiner for the last year. The combination of teachings was further argued as inoperative. To suggest that the combination was not argued is a distortion of the record. It is respectfully submitted that the combination of the citations has been argued at length before the Examiner.

The Examiner alleges that "it would be obvious ... to apply the teaching of generating background noise as taught by Uchino et al. in the telephone of Swaminathan et al." Background to what? The signal generated in the apparatus disclosed in the Uchino et al. publication is a **test** signal. It is not "background" to

anything. It is respectfully submitted that the Examiner is mischaracterizing the prior art to find obviousness.

The Examiner does not explain why it is obvious to eliminate the "snippet" comfort noise disclosed in the Swaminathan et al. patent and substitute measuring phase delay as disclosed in the Uchino et al. patent.

The Examiner asserts the following in the final Office Action.

> "In the present situation, the Swaminathan et al. reference was used to teach the concept of comfort noise generation for a wireless telephone (Abstract), and the Uchino et al. reference was used to teach generating background noise in accordance with the magnitude of the signal (Paragraph 457). The examiner then contended that it would be obvious to one of ordinary skill in the art to apply the teaching of generating background noise as taught by Uchino et al. in the telephone of Swaminathan et al. since it already has a comfort noise generating means in order to generate noise signal "having a characteristic along the power spectrum density distributions of the frequency fluctuations" (Uchino et al.: Paragraph 478). In other words, one would be motivated to incorporate Uchino et al.'s teaching in order to generate a noise signal that corresponds to the magnitudes of the different frequency sub-bands thus resulting in a more consistent result when coupled to the transmit or receive channel."

The paragraph reads as though something is missing. Why cite the Swaminathan et al. patent "to teach the concept of comfort noise generation for a wireless telephone" when appellants concede in the Background of the Invention that the broad concept is old? Why not cite the patents cited by appellants? What was it about the Swaminathan et al. patent that caused the Examiner to cite it?

As written, the quoted paragraph basically says that, absent the Swaminathan et al. patent, there would not be any mention of comfort noise (the Uchino et al. publication does not mention comfort noise). Thus, the rejection comes down to an assertion that it is obvious to generate comfort noise in the manner that the Uchino et al. publication generates test signals. If the method and apparatus disclosed in the Uchino et al. publication were the same as, or close to, the claimed method and apparatus, the assertion might have some validity. The Uchino et al. publication is **unrelated** to the method and apparatus claimed by appellants and the assertion fails.

The Examiner alleges that "Uchino et al. disclose a method for providing a noise signal in a digital communication system." As clear from the quote from paragraph [0002], this assertion is not true. The "device under analysis" is a "digital line," which in less pretentious terms is a wire, perhaps coaxial, perhaps a twisted pair of wires. To characterize a wire as a "digital communication system" is an aggrandizement that exceeds the published application. To mischaracterize the prior art in order to support a rejection is improper and vitiates the rejection.

In the section Response to Arguments, the Examiner says "digital line 1, which constitutes a digital communication system." How does a wire know whether a signal is digital or analog? Even power lines exhibit variable phase shift, the parameter under test by the apparatus disclosed by the Uchino et al. publication.

The reliance on the Uchino et al. publication is an assertion that putting noise into a wire to test the electrical characteristics of the wire teaches, not just comfort noise, but a particular kind of comfort noise. Appellants respectfully disagree because (1) there is no basis for the combination, (2) the interpretation of a wire as a communication system does violence to the ordinary meaning of the words, and (3) the combination is **inoperative** for the reason given below.

> "The appellant further argues that Uchino et al. do not disclose that "the magnitudes of the white noise into each QMF filter is controlled in accordance with the magnitude of the signal in the corresponding sub-band in the one channel". The examiner respectfully disagrees. The examiner again asserts that paragraph 457 of Uchino et al. disclose this limitation. Paragraph 457 states that "The weighting coefficients σ1 – σ13 have values proportional to the square roots of magnitudes of spectra in the respective bands of the power spectrum density distribution". This proportionality relationship is interpreted as equivalent to the cited limitation since the weighting coefficients are set in accordance to the magnitude of the spectra/sub-bands. " [underscore in Office Action]

What is the power spectrum density distribution characteristic Sy(f)? It is a table of **constants**, defined in subsequent paragraphs of the publication. Signals σ_1–σ_{13} are defined in paragraphs [458–470] as **fixed** weights.

What do the claims recite? The claims recite that the magnitude of the noise is controlled "in accordance with the magnitude of the signal in a corresponding sub-band."

What is the signal in a sub-band? The signal is a **variable**. Disclosing a constant does not disclose or suggest a variable, any variable. It certainly does not disclose or suggest the specific variable claimed.

Blithely ignoring paragraphs [0457]–[0471] just because they are unfavorable to the Examiner's position is not proper examination. Plugging in constants where variables should go does not yield the invention as claimed. The result is an **inoperative** system.

The Uchino et al. publication discloses the following in the paragraphs indicated.

> "[0348] The clock signal CK1 output from the wander generator 21 thus configured is input to the transmission unit 40 illustrated in FIG. 1, as mentioned above.
>
> "[0349] Then, a digital signal Sa synchronized with the clock signal CK1 is sent from the transmission unit 40 to the digital line 1 under testing.
>
> "[0350] Then, a digital signal Sa' returned from the digital line 1 is received by the reception unit 41, and subsequently its error rate is measured by the error measuring unit 42."

Measuring return delay in a "digital line" is known as measuring echo. This is irrelevant to comfort noise.

The Examiner alleges that the Uchino et al. publication discloses "a plurality of sub-band filters band (Paragraph 452)." Paragraph 452 reads as follows.

> "[0452] Therefore, the latch circuit **532** outputs every fourth noise signals n2 [n(2), n(6), n(10),... , n(2+4i),...] from n(2) at a rate 1/4 the clock signal CKn (8 Hz), as illustrated in FIG. 25F."

It is respectfully submitted that this is no disclosure of sub-band filters.

The Examiner alleges that the Uchino et al. publication discloses coupling white noise through first and second multipliers. Assuming arguendo that this broad assertion is true, FIG. 24 of the Uchino et al. patent clearly discloses that the multipliers perform a weighting function based upon signals $\sigma 1 \sim \sigma 13$. These signals are defined on page 17, paragraphs [458–470] as **fixed** weights. As illustrated in appellant's FIG. 6, and as recited in claims 2, 3, 6 and 8, the inputs to the multipliers are signals from sub-band filters. The circuits are obviously completely unrelated in function, purpose, or construction. Where is the teaching?

It is respectfully submitted that the prior art applied does not disclose or suggest the steps recited in claim 1 or the apparatus recited in claim 6. The details recited in the respective dependent claims are not remotely disclosed or suggested.

Conclusion

In view of the foregoing, it is respectfully submitted that the rejection of claims 1-10 is in error and should be reversed.

Respectfully submitted,

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VII. Claims Appendix

1. A method for providing a comfort noise signal in a telephone having a receive channel and a transmit channel and a plurality of sub-band filters in at least one channel, said method comprising the steps of:

generating a white noise signal;

applying the white noise signal to a QMF filter bank to produce a comfort noise signal, wherein the magnitude of the white noise into each QMF filter is controlled in accordance with the magnitude of the signal in a corresponding sub-band in the one channel; and

selectively coupling the comfort noise signal to at least one of the channels.

2. The method as set forth in claim 1 wherein said applying step includes the steps of:

coupling white noise signal through a first multiplier to the low pass input of the QMF bank;

coupling white noise signal through a second multiplier to the high pass input of the QMF bank;

controlling the gain of the first multiplier in accordance with the magnitude of the signal in a first analysis sub-band;

controlling the gain of the second multiplier in accordance with the magnitude of the signal in a second analysis sub-band;

wherein the first sub-band has a lower frequency than the second sub-band.

3. The method as set forth in claim 2 and further including the steps of:

combining the output signals from two or more analysis sub-band filters to produce a combined signal; and

controlling the gain of the second multiplier in accordance with the combined signal.

4. The method as set forth in claim 3 wherein the telephone includes n analysis sub-bands and there are no more than (n–1) QMF banks and further including the step of:

upwardly cascading the QMF banks to increase the low frequency resolution of the comfort noise signal.

5. The method as set forth in claim 3 wherein the telephone includes n analysis sub-bands and there are no more than (n–1) QMF banks and further including the step of:

combining the outputs from higher frequency sub-band filters to increase the low frequency resolution of the comfort noise signal.

6. In a cellular telephone having an antenna, an RF stage coupled to said antenna, and a signal processing circuit including an audio processor having a receive channel and a transmit channel and a plurality of analysis sub-band filters in at least one of the channels, said cellular telephone characterized by a comfort noise generator comprising:

a white noise generator;

at least one QMF bank producing a comfort noise signal, said QMF bank having a high pass input and a low pass input;

a first multiplier having a control input coupled to a first of said analysis sub-band filters;

a second multiplier having a control input coupled to a second of said analysis sub-band filters;

wherein the first multiplier couples said white noise generator to said low pass input and said second multiplier couples said white noise generator to said high pass input;

means for selectively coupling the comfort noise signal to at least one of the channels.

7. The cellular telephone as set forth in claim 6 and further comprising:

n analysis sub-band filters and

no more than (n–1) QMF banks;

wherein the QMF banks are upwardly cascaded.

8. The cellular telephone as set forth in claim 6 and further including:

at least one summation circuit for coupling the outputs of more than one analysis sub-band filter to the control input of a multiplier.

9. The cellular telephone as set forth in claim 8 and further comprising:
n analysis sub-band filters and
no more than (n–1) QMF banks;
wherein the QMF banks are upwardly cascaded.

10. The cellular telephone as set forth in claim 9 wherein the number of QMF banks is ($n/2$ –1).

IX. Evidence Appendix

There were no affidavits filed in this application.

X. Related Proceedings Appendix

There are no related proceedings.